

Code 923 Highlights for January - February 2004

**** Patent application filed for a SPECTRAL-RATIO BIOSPHERIC LIDAR**

The invention by Robert Knox, Code 923, was originally disclosed in November 2000 and since refined with internal support from the Biospheric Sciences Branch and valuable critiques by colleagues in the Laboratory for Terrestrial Physics. The patent application was written by Chan Park of the Office of Patent Counsel. Quoting from the application abstract: "The present invention is directed to a spectral-ratio biospheric LIDAR which can vertically resolve spectral reflectance ratios (Red/NIR) at the reflectance transition of chlorophyll of vegetation. In addition to range to the vegetation and the vertical distribution of illuminated surfaces making up the vegetation, the present invention measures reflectance ratios for the major features in the distribution to distinguish surface types of the vegetation by relying on differential absorption of red and NIR light by chlorophyll." The pending patent focuses on a novel combination of telecommunications components, pseudo-random signal modulation, and light wave-bands particularly suited distinguishing green leaves from other natural and artificial surfaces. In related developments Knox has been working with Jonathan Rall (Code 924) on both a measurement proof-of-concept using components and modulation similar to prior art, and on reducing the new invention to practice as a way of providing the power scaling needed to make the spectral-ratio measurement from orbit or high-altitude aircraft.

• * Biospheric Sciences Branch (Code 923) scientists' proposals successful

Several 923 scientists were selected for funding under NRA-03-OES-02, "Earth System Science Research using Data and Products from TERRA, AQUA and ACRIM Satellites" announced on Dec. 22, 2003.

P.I.s:

Oleg Dubovik, Enhanced Remote Sensing of Atmospheric Aerosol by Multi-Sensor AERONET/MISR/MODIS Retrieval

Forrest Hall, Physically-Based Continuous Fields and Land Cover Mapping Algorithm Using Modis and Multi-Source Data

K. Jon Ranson, Boreal Zone Forest Type and Structure from EOS Data Sets,

Co-I s:

Jeff Privette, Maintaining and Refining NASA's Land Product Validation Infrastructure; Jeffrey Morisette (922) P.I.

Jeff Pedelty, Value Added Products from Vegetation and Precipitation Time-Series Data Sets in Support of Invasive Species Prediction; Jeffrey Morisette (922) P.I.

Jim Collatz, Using Satellite and Inverse Techniques to Constrain Regional and Global Fire Emissions from 1997 to 2005: An Approach Based on the Carbon Isotope Ratio of Fire Emissions; James Randerson, California Institute of Technology, P.I.

**** Terra Project Science Web page selected as one of “10 cool sites”**

The Terra Project Science Web page was selected by the Exploratorium as one of its “10 cool sites.” The Terra site provides timely information about the spacecraft, instruments, links to data products and publication, and provides status updates for the mission. The URL is <http://terra.nasa.gov>.

The Exploratorium was one of the first science museums to build a site on the World Wide Web and now serves 15 million visitors a year. The site now contains over 15,000 Web pages exploring hundreds of different topics.

The current list of cool sites is at http://www.exploratorium.edu/learning_studio/sciencesites.html.

**** Levine attends GLOBE program meeting now managed by UCAWCSU**

Elissa Levine, Code 923, attended the first meeting of the GLOBE program in Boulder, Colorado, since its management was transferred from NASA to UCAWCSU last October. The meeting consisted of working sessions to review a new strategic plan proposed by the UCAWCSU GLOBE group which would guide the direction of GLOBE in the next few years. Issues discussed included education guidelines, science focus, training strategies, and fund raising to support this growing program which now includes 105 countries and over 120,000 schools.

**** Jim Tucker (Code 923) participates in the Jason Expedition to Panama**

Jim Tucker (Code 923) is taking part in the Jason Expedition to Panama from 1/26-2/6/2004. This involves 55 1-hour educational broadcasts from Barro Colorado Island, Panama. It can be viewed live on www.jason.org. Tucker's involvement is that of a supporting person spending from 5-10 minutes per broadcast talking about satellite data for studying rain forests, depending on what the question of the day is and what other specifics are being dealt with that day.

Approximately 35,000 teachers and 1.7 million students will view the Jason broadcasts. Bob Ballard, discoverer of the Titanic, is the host of the Jason broadcasts. The last broadcast will be Friday, February 6.

• * Press release re: Urbanization and Net Primary Production in the U.S.

A paper by Biospheric Sciences Branch personnel was just published by Remote Sensing of Environment regarding the impact of urbanization on Net Primary Production in the US. The paper is entitled "The consequences of urban land transformation for net primary productivity in the United States" by Marc L. Imhoff (Code 923), Lahouari Bounoua (Code 923), Ruth DeFries, William T. Lawrence, David Stutzer, Compton J. Tucker (Code 923), and Taylor Ricketts.

2004 Remote Sensing of Environment, Vol. 69, Issue 4, pp. 434-443.

The press release can be viewed at:
<http://www.gsfc.nasa.gov/topstory/2004/0202cityland.html>

• * Special section on BOREAS Remote Sensing Science in Remote Sensing of Environment

A special section on remote sensing science of the Boreal Ecosystem Atmosphere Study (BOREAS) has appeared in Remote Sensing of Environment Volume 69 Issue 2. The BOREAS section was edited by Fred Huemmrich (Code 923) and contains 6 papers including an overview paper on lessons learned in BOREAS by many of the remote sensing scientists involved in BOREAS.

BOREAS was an integrated interdisciplinary field study of a region in central Canada with field campaigns between 1993 and 1996. BOREAS was designed to improve understanding of the boreal forest biome and its interactions with the atmosphere. A number of innovative remote sensing approaches and analyses grew out of this work. In the paper we discuss four key areas: (1) the definition

and measurement of vegetation structure, (2) land-cover classification, (3) assessment of the carbon balance, and (4) links between surface properties, weather, and climate. In addition a principal legacy of BOREAS is its well-documented and publicly available database.

A list of the papers in the BOREAS remote sensing section, RSE 89(2):

Remote sensing in BOREAS: Lessons learned pp. 139-162
J.A. Gamon, K.F. Huemmrich, D.R. Peddle, et al.

Radar remote sensing of the spring thaw transition across a boreal landscape pp. 163-175
J.S. Kimball, K.C. McDonald, S. Frolking, et al.

Retrieval of the canopy leaf area index in the BOREAS flux tower sites using linear spectral mixture analysis pp. 176-188
Baixin Hu, John R. Miller, Jing M. Chen, et al.

Needle chlorophyll content estimation through model inversion using hyperspectral data from boreal conifer forest canopies pp. 189-199
Pablo J. Zarco-Tejada, John R. Miller, John Harron, et al.

Evaluating image-based estimates of leaf area index in boreal conifer stands over a range of scales using high-resolution CASI imagery pp. 200-216
Richard A. Fernandes, John R. Miller, Jing M. Chen, et al.

Systematic corrections of AVHRR image composites for temporal studies pp. 217-233
J. Cihlar, R. Latifovic, J. Chen, et al.

Approaches to fractional land cover and continuous field mapping: A comparative assessment over the BOREAS study region pp. 234-251
Richard Fernandes, Robert Fraser, Rasim Latifovic, et al.

Large area forest classification and biophysical parameter estimation using the 5-Scale canopy reflectance model in Multiple-Forward-Mode pp 252-263
Derek R. Peddle, Ryan L. Johnson, Josef Cihlar, et al.

. * Final Volume of SAFARI 2000 CDROM Series is Now Available

The 5-disk Volume III of the SAFARI 2000 CDROM Series was just produced and is now available (500 copies). The volume largely focuses on the SAFARI Wet Season Campaign in March 2000, as well as surface fluxes and fires. Much of this data is value-added and unavailable elsewhere, including products from MODIS land and atmosphere teams (packaged as flat binary), a subset of meteorological fields from the GMAO, and data from various aircraft and ground-based sensors. This volume has an HTML interface, and interacts seamlessly with Volumes 1 and 2, resulting in an effective 12-disk desktop data system. The CDs will be distributed to all data providers, as well as to the MODIS and NPP Science Teams. Thereafter, copies will be available through the Oak Ridge National Laboratory DAAC. SAFARI was interdisciplinary science activity designed to develop a better understanding of the southern Africa earth-atmosphere-human system. Programmatically, it served as an organizational umbrella to maximize the efficiency and effectiveness of environmental studies in the region.

Interested persons may check the online-version of the CDROM at:

http://ltpwww.gsfc.nasa.gov/s2k/html_pages/s2k_home.html

Advanced copies are available from Jeff Privette/G423.